Sentinel

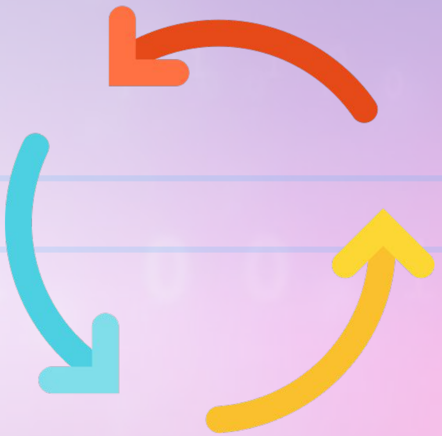
<Delve into Web Dev>

DEFENDING OUR DIGITAL WAY OF LIFE

Recap

Loops will execute a block of code multiple times

What types of loops are there in JavaScript?



For Loops

While Loops

For…of Loops

Recap

Write a while loop:

```
let number = 0
while (number < 5) {
      /*do something*/
      number++
}
```

Write a for loop:

```
for (let number = 1; number <= N; number++){
      /*do something*/

}
```

Recap

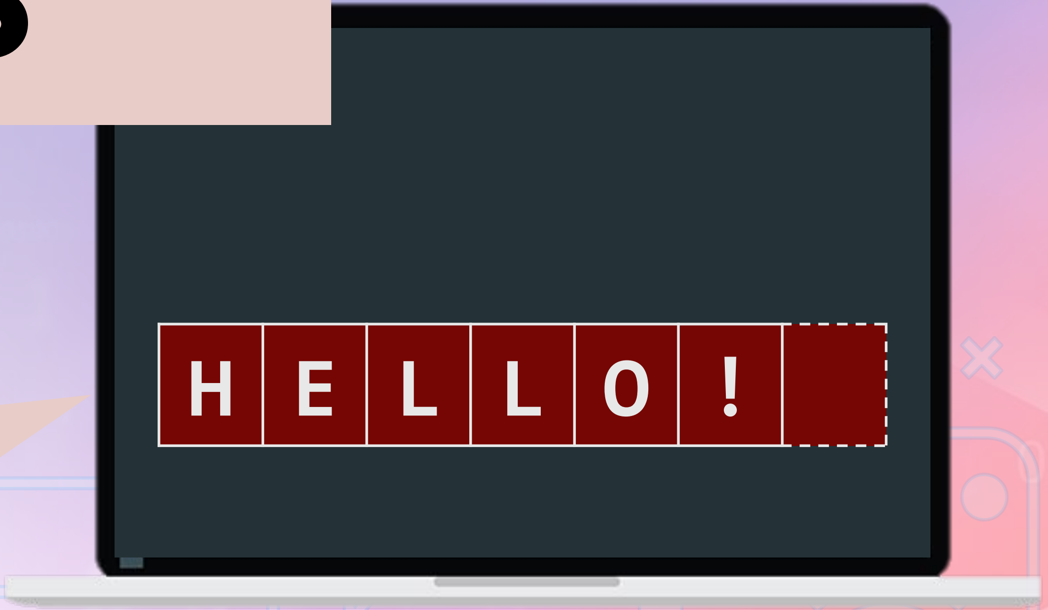
Write a for…of loop

```
let message = "Hear ye!"

for (const character of message) {
    console.log(character)
}
```

Arrays

Hello!



H	E	L	L	O	!	

Learning Objective

Arrays, what are they?

Looping through arrays

Array length

Push, pop, shift, unshift

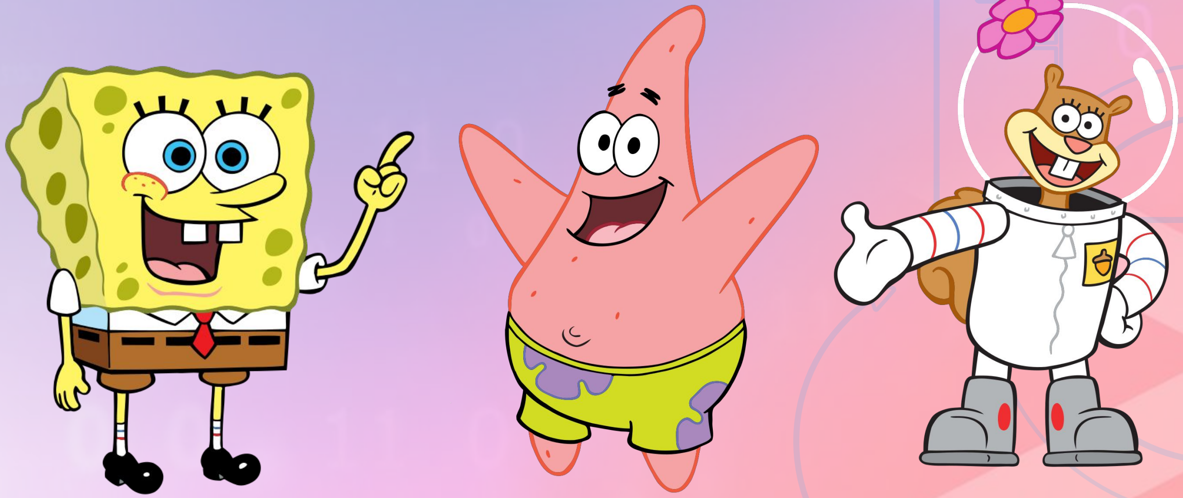
String to array, array to String

Party

Let's host a party! 🎉

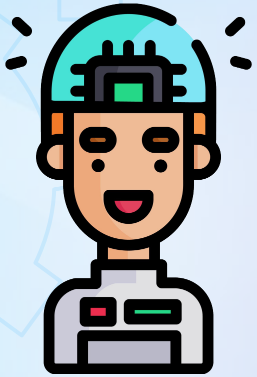
Who shall we invite? We'll make a list:

- Spongebob
- Patrick
- Sandy
- …



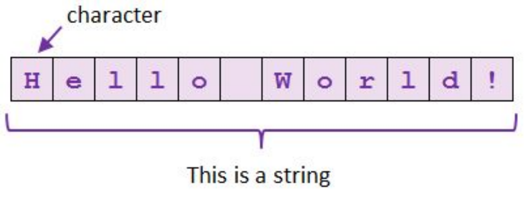
Then send each one an invite!

JavaScript Party



How can we host the party in JavaScript?

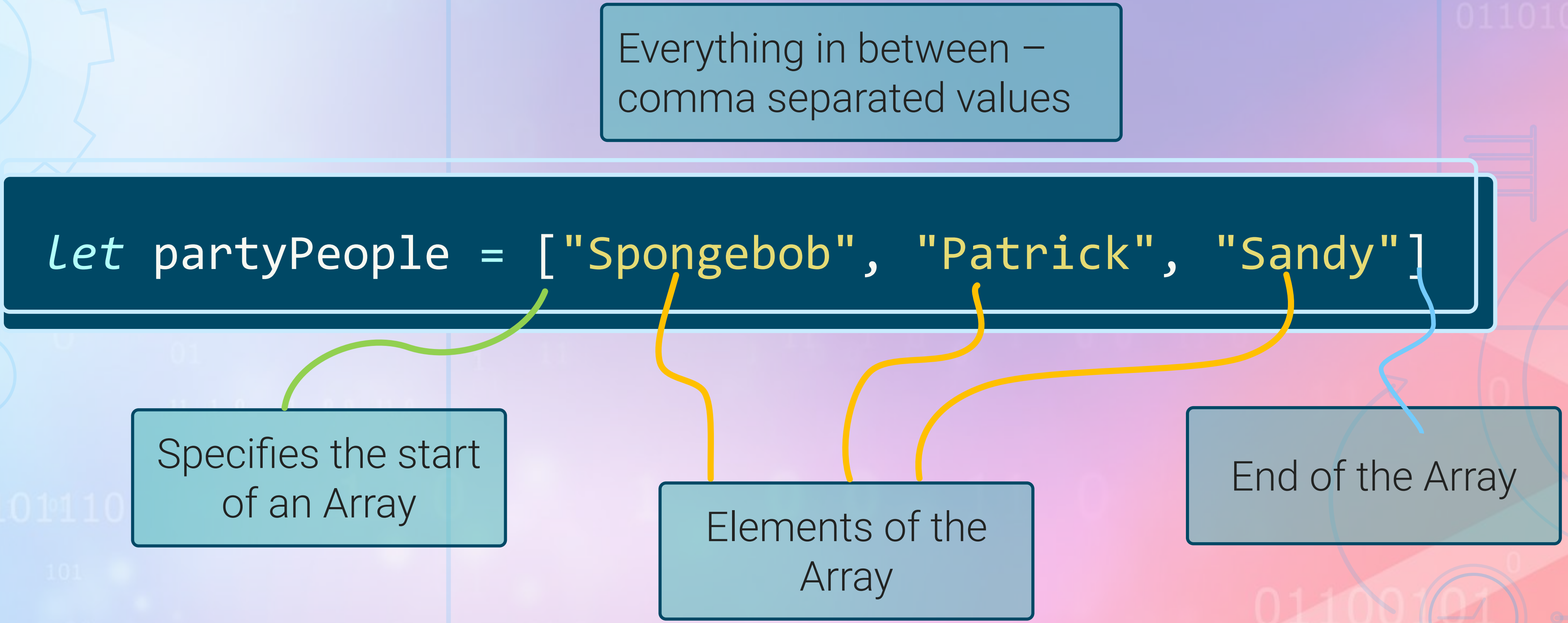
Well, remember how strings are just a list of characters?



Maybe we can make a list of other things?

Arrays

Lists in JavaScript are called “Arrays”:



```
let partyPeople = ["Spongebob", "Patrick", "Sandy"]
```

Everything in between – comma separated values

Specifies the start of an Array

Elements of the Array

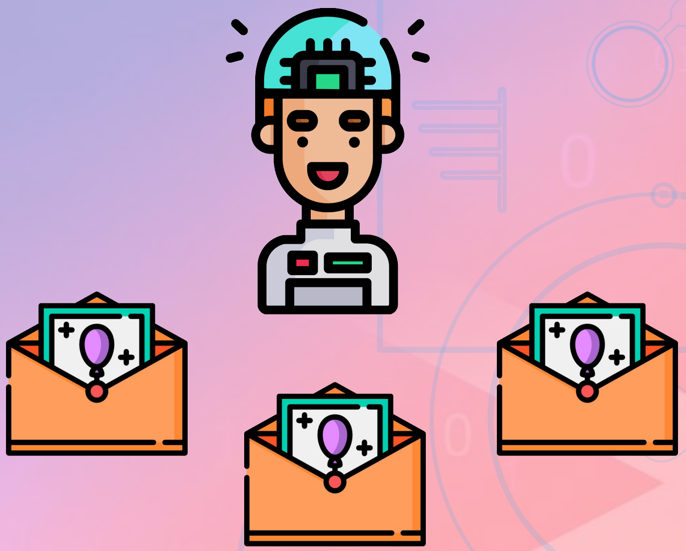
End of the Array

Looping over Arrays

We can loop over arrays the same way we did for strings.

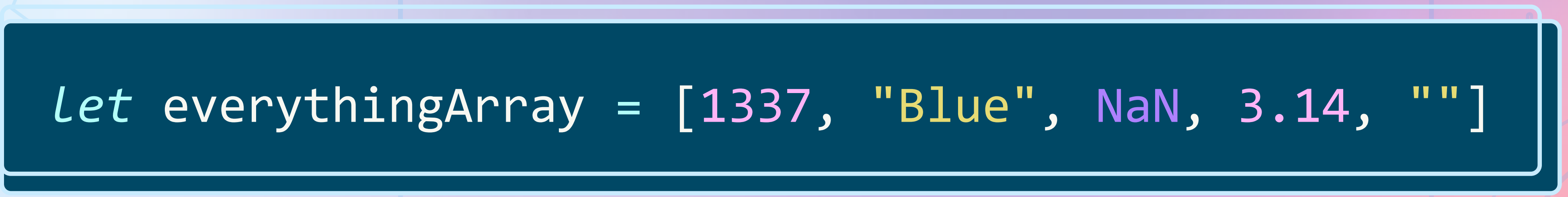
Let's send out the invites!

```
for (const person of partyPeople) {
    sendInvite(person)
}
```



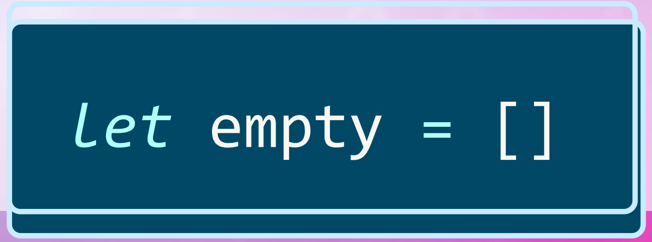
More Values

Arrays aren’t limited to just strings, any value can be an item in an array



```
let everythingArray = [1337, "Blue", NaN, 3.14, ""]
```

And they can be as small or as large as you want (almost)



```
let empty = []
```

Array Length

We can use the length property to check how many items are in the Array:

```
let everythingArray =
[1337, "Blue", NaN, 3.14, ""]
```

```
everythingArray.length □ 5
```

```
let emptyArray = []
```

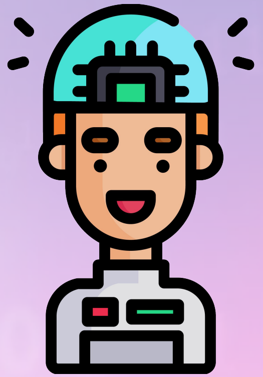
```
emptyArray.length □ 0
```

Problem Solving 1

$$\bar{X} = \frac{\sum X}{N}$$

```
[
   2, 6, 3, 9, 6, 2, 3, 2,
   4, 2, 6, 1, 5, 5, 5, 9,
   7, 1, 0, 6, 7, 1, 8, 5,
   0, 1, 6, 4, 0, 0, 9, 0,
   3, 6, 2, 1, 0, 9, 2, 6,
   7, 5, 7, 4, 2, 7, 3, 8,
   9, 6, 3, 5, 2, 3, 6, 9,
   8, 7, 0, 9, 7, 9, 3, 5,
   7, 8, 4, 8, 8, 6, 7, 7,
   6, 8, 4, 9, 0, 4, 1, 6,
   7, 4, 3, 8, 2, 6, 9, 9,
   3, 2, 8, 6, 3, 6, 0, 2,
   9, 2, 7, 8, 4, 9, 6, 1,
   0, 2, 0, 2, 7, 0, 4, 3,
   2, 2, 5, 2, 5, 9, 1, 6,
   4, 3, 6, 5, 2, 9, 5, 2,
   3, 1, 2, 5, 1, 3, 9, 0,
   3, 7, 8, 3, 6, 8, 3, 2,
   4, 3, 5, 3, 5, 5, 7, 7,
   4, 8, 4, 3, 7, 0, 2, 5
]
```

How can we use an Array to calculate the average value of a list of numbers?



Calculating Average

$$\boxed{\bar{X} = \frac{\sum X}{N}}$$

$$X = [2, 6, 3, 9, 6, \dots, 2, 5]$$

Step 1. Sum up the elements: $\sum X = 2 + 6 + 3 + 9 + 6 + \cdots + 2 + 5$

Step 2. Divide by the number of elements: $\bar{X} = \frac{\sum X}{X.length}$

Solution

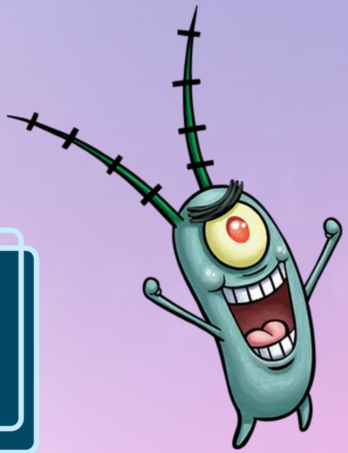
```
const NUMBERS = [1337, 1, 3, 3, 7, 0]

let sum = 0
for (const number of NUMBERS) {
    sum += number
}
let average = sum / NUMBERS.length
```

Oh no… We forgot Plankton

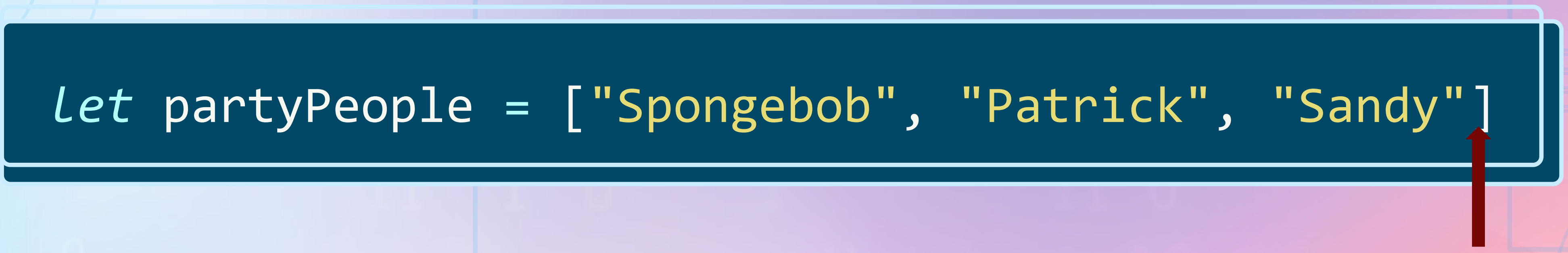
We can **modify** an Array after it’s been initialized

```
partyPeople.push("Plankton")
```



Array Methods

push – append an item to the end of the Array

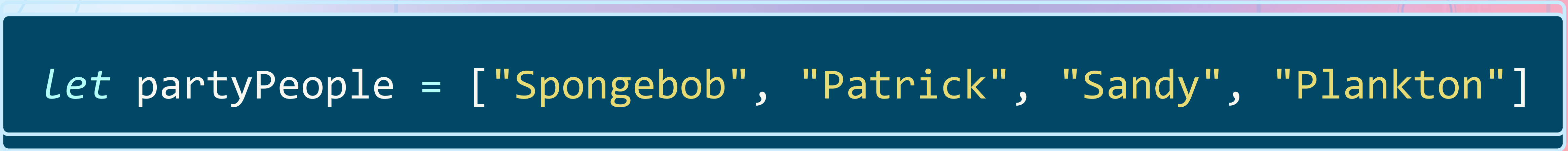


```
let partyPeople = ["Spongebob", "Patrick", "Sandy"]
```

Append Here

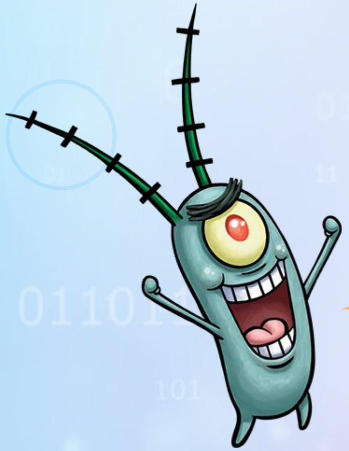
Array Methods

push – append an item to the end of the Array



```
let partyPeople = ["Spongebob", "Patrick", "Sandy", "Plankton"]
```

Append Here

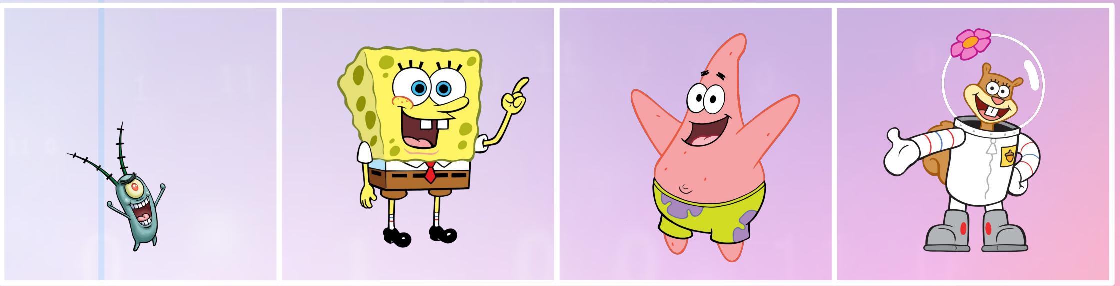


Cooool! But what else can we do with Arrays?

Array Methods

pop – remove and return the last item

```
partyPeople.pop()
```



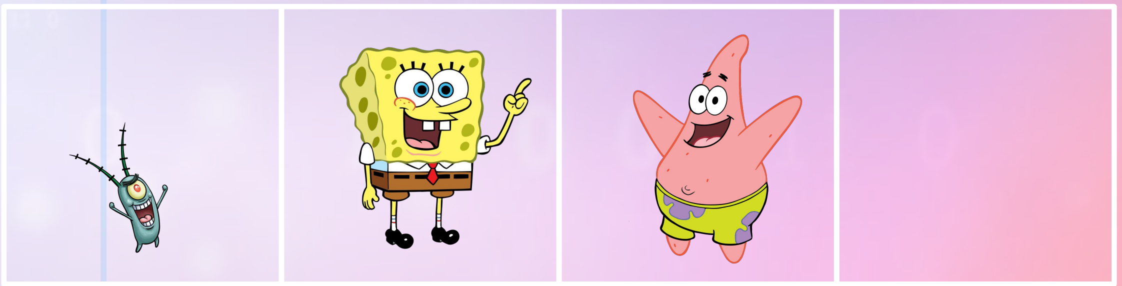
Array Methods

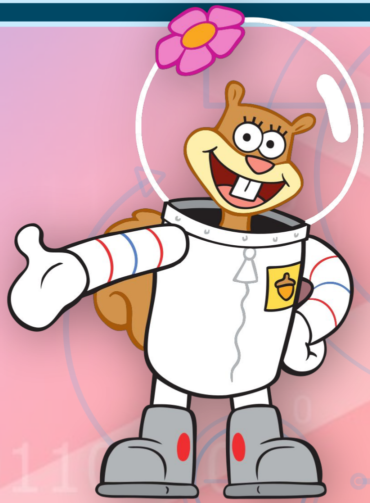
pop – remove and return the last item

```
partyPeople.pop()
```

shift – remove and return the first item

```
partyPeople.shift()
```





Array Methods

pop – remove and return the last item

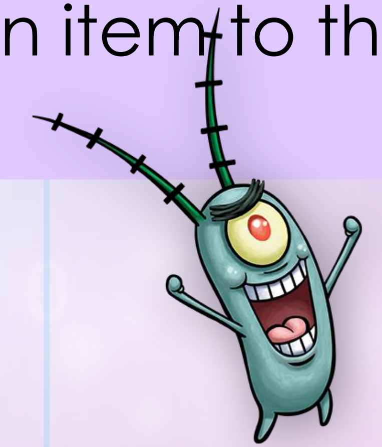
```
partyPeople.pop()
```

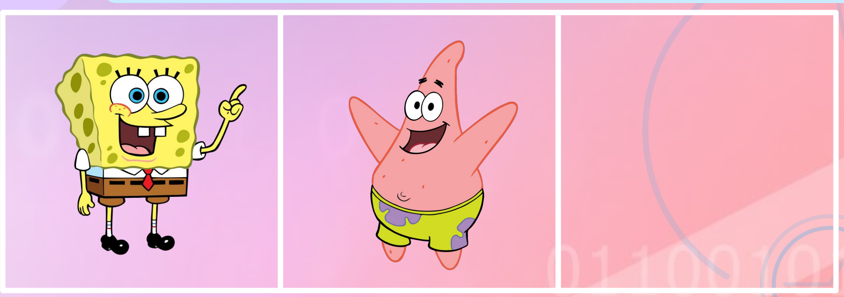
shift – remove and return the first item

```
partyPeople.shift()
```

unshift – insert an item to the beginning

```
partyPeople.unshift(“Gary")
```





Array Methods

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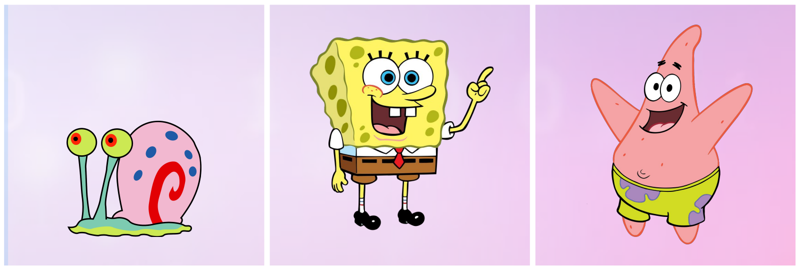
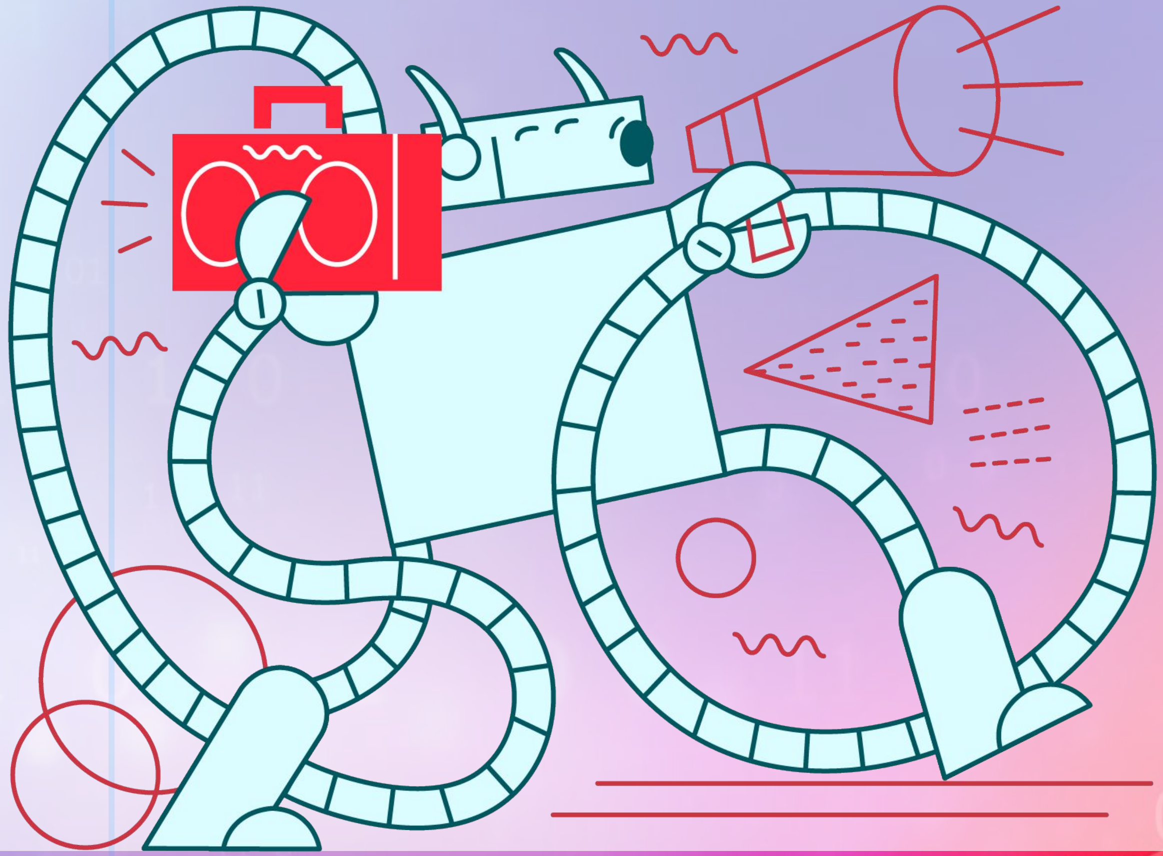
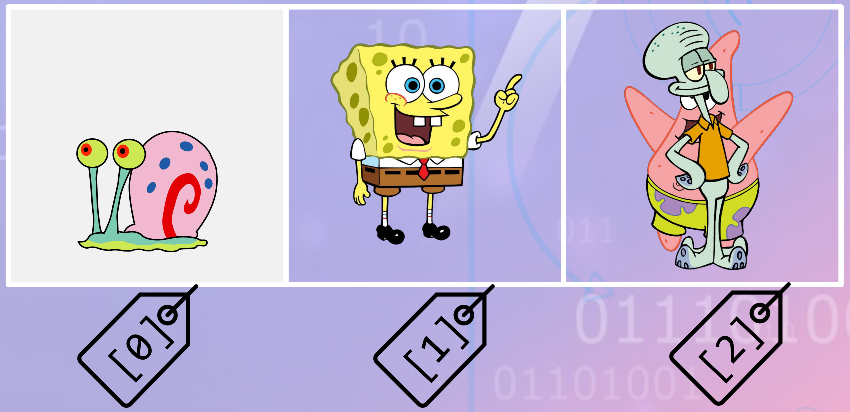


Demo



Indexing



Like strings, arrays can be indexed!

```
let partyPeople = ["Spongebob", "Patrick", "Sandy"]
partyPeople[0] // Notice, Arrays are zero-indexed!
partyPeople[1]
```

But the values can also be changed:

```
partyPeople[2] = "Squidward"
```

Indexing

How would you access the last element of an Array?

1

```
partyPeople[partyPeople.length]
```

2

```
partyPeople[partyPeople.length - 1]
```

Indexing

How would you access the last element of an Array?

A: Because arrays are zero-indexed, the answer is 2!

2

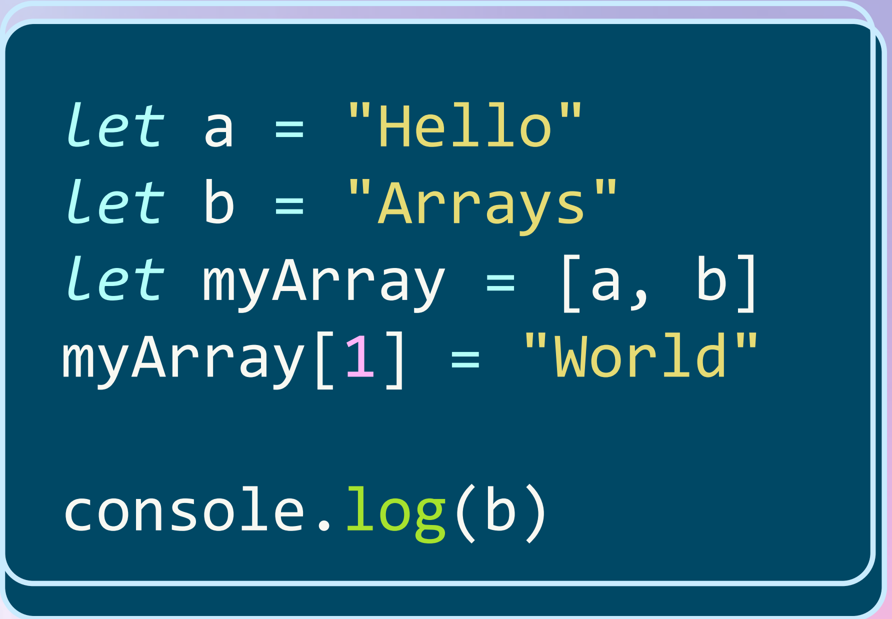
```
partyPeople[partyPeople.length - 1]
```

OR

```
partyPeople.at(-1)
```

Variables in Arrays

You might be wondering, what happens if we do this?



```
let a = "Hello"
let b = "Arrays"
let myArray = [a, b]
myArray[1] = "World"

console.log(b)
```

```
World
```

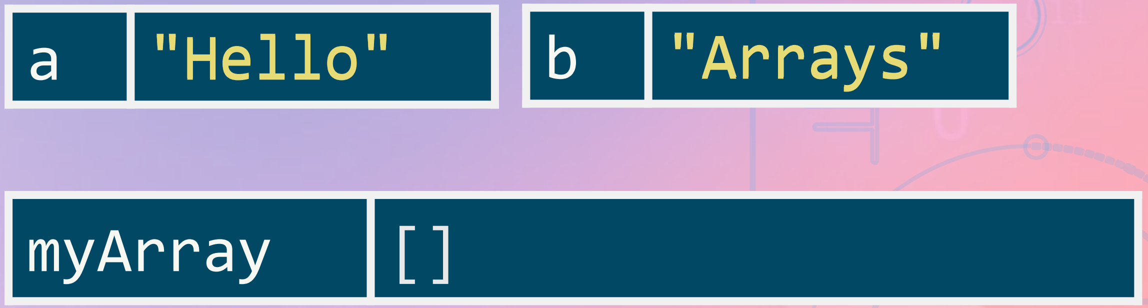
OR

```
Arrays
```

Variables in Arrays

You might be wondering, what happens if we do this?

```
let a = "Hello"
let b = "Arrays"
let myArray = [a, b]
myArray[1] = "World"
```



a "Hello"

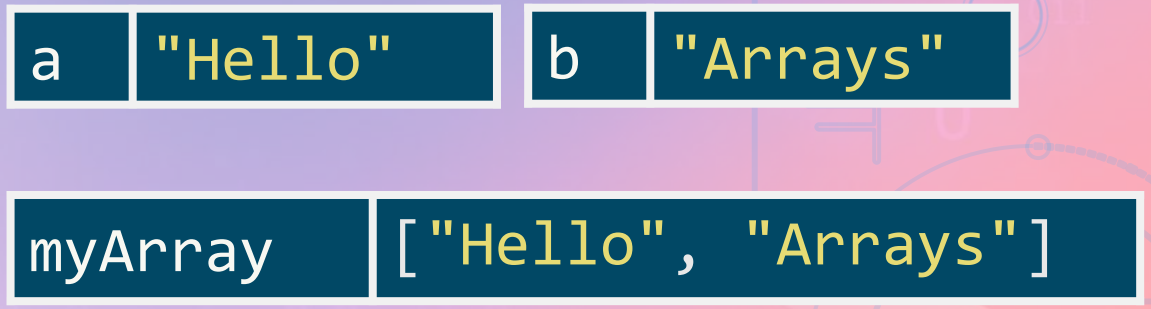
b "Arrays"

myArray []

Variables in Arrays

You might be wondering, what happens if we do this?

```
let a = "Hello"
let b = "Arrays"
let myArray = [a, b]
myArray[1] = "World"
```



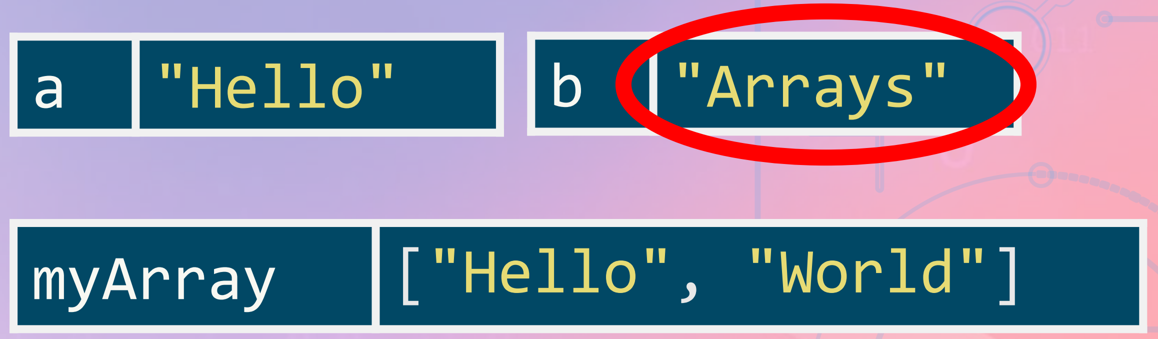
a	"Hello"
b	"Arrays"
myArray	["Hello", "Arrays"]

The values are copied into the new array

Variables in Arrays

You might be wondering, what happens if we do this?

```
let a = "Hello"
let b = "Arrays"
let myArray = [a, b]
myArray[1] = "World"
```

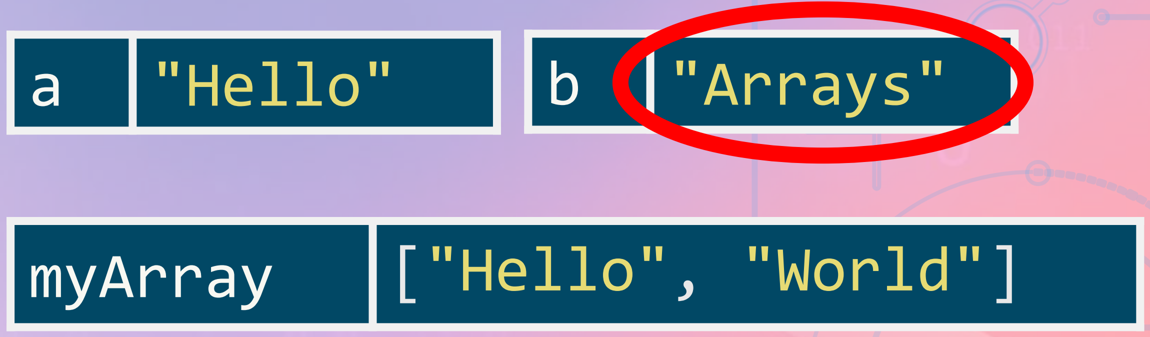


So `myArray[1] = "World"` will not change `b`

Variables in Arrays

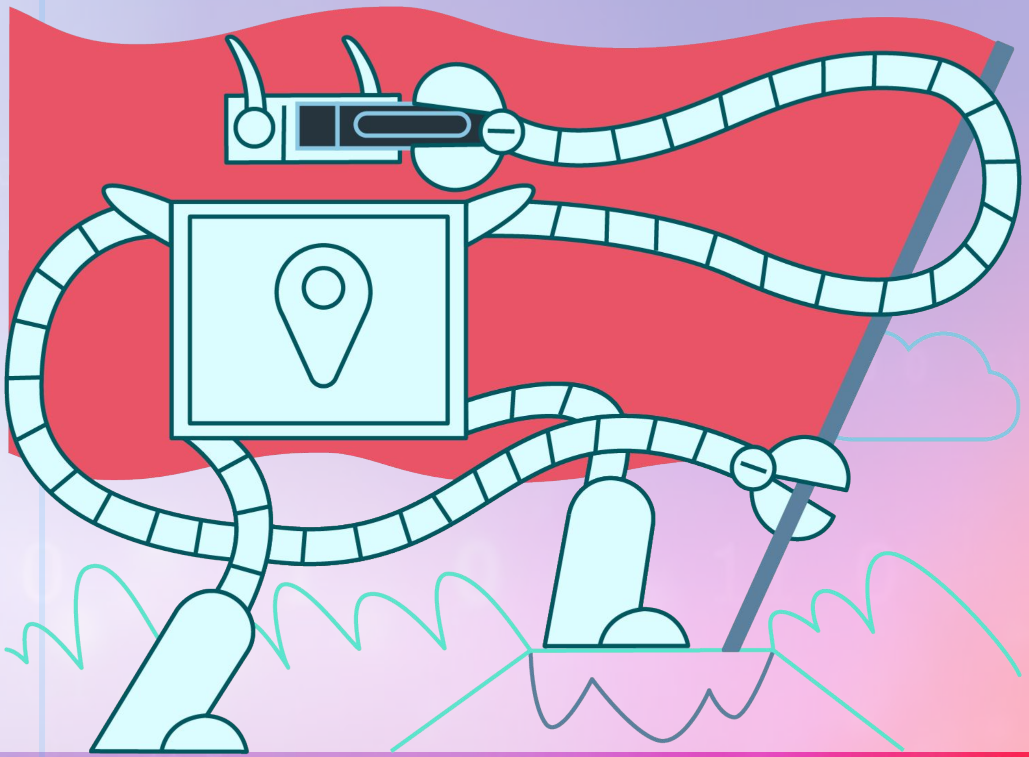
You might be wondering, what happens if we do this?

```
let a = "Hello"
let b = "Arrays"
let myArray = [a, b]
myArray[1] = "World"
```



So `myArray[1] = "World"` will not change **b**

Problem Solving 2



Motivation

In our code breaker app, we need to:

1. Convert the ciphertext into an Array
2. Substitute the letters based on the key
3. Convert the array back to a string

Let's see how we can perform these conversions

String to Array

```
let myString = "SFNKYHOSU"

let myArray = Array.from(myString)

// Now we can modify the Array
```

1. Convert the ciphertext into an Array

String to Array

```
let myString = "SFNKYHOSU"

let myArray = Array.from(myString)

// Now we can modify the Array
```

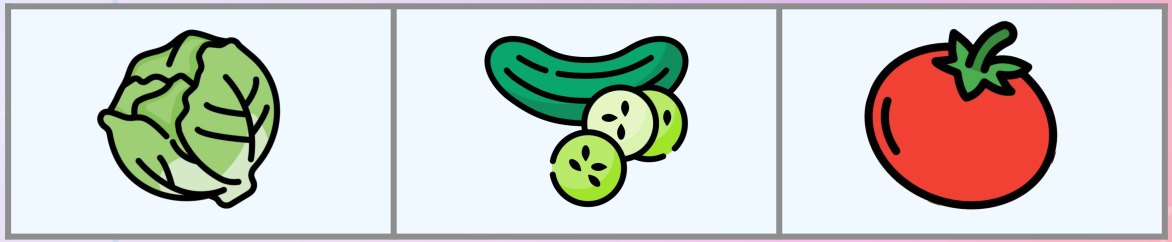
Convert string into Array

"S"	"F"	"N"	"K"	"Y"	"H"	"O"	"S"	"U"

String to Array

We can also use **myString.split()**
split also accepts a “separator” argument. E.g.

```
let myString = "Lettuce, Cucumbers, Tomatoes"
let veggies = myString.split(", ")
// ["Lettuce", "Cucumbers", "Tomatoes"]
```



Array to String

```
let newString = myArray.join()
console.log(newString)
```

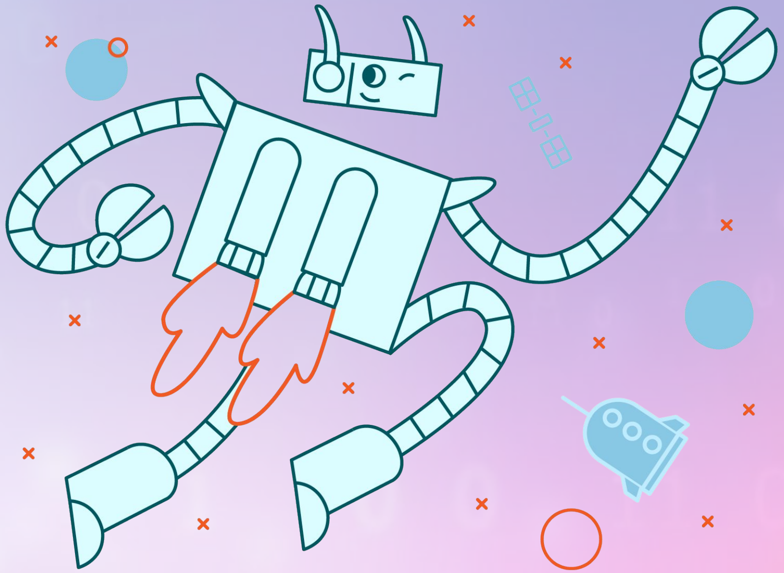
3. Convert the array back to a string

join also accepts a “separator” argument. E.g.

```
partyPeople.join(", ")
// "Spongebob, Patrick, Squidward, Plankton"
```

Let's do something useful

Demo: Writing a simple Caesar Cipher Encryptor/Decryptor



Some more methods

reverse – reverse the order of the elements in the Array
sort – sort the items in the Array
slice – get a range of items from the Array
splice – insert/replace items in the Array
indexOf – get the index of a value in the Array

Feel free to read the documentation for these!

Summary

An Array is a list in JavaScript

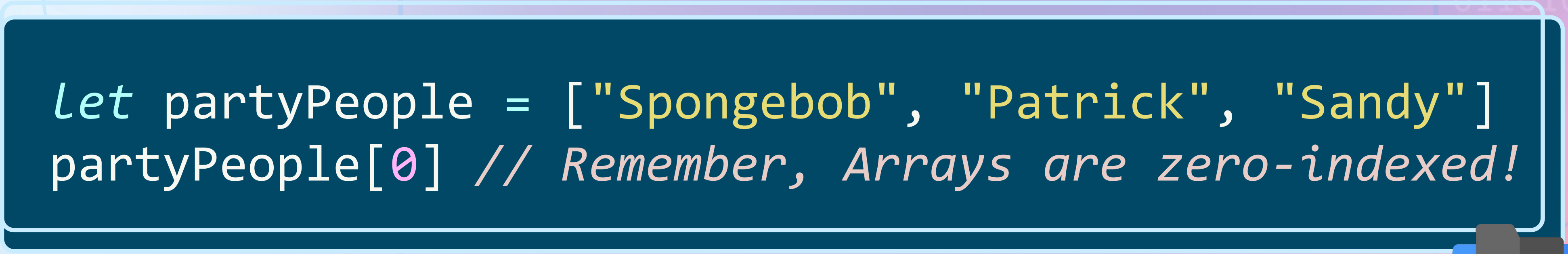
```
let partyPeople = ["Spongebob", "Patrick", "Sandy"]
```

To iterate through the array

```
for (const person of partyPeople) {
    sendInvite(person)
}
```

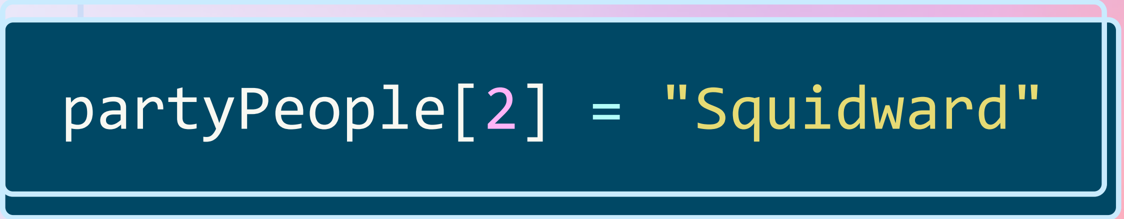
Summary

Arrays are zero indexed



```
let partyPeople = ["Spongebob", "Patrick", "Sandy"]
partyPeople[0] // Remember, Arrays are zero-indexed!
```

And the values can be changed:



```
partyPeople[2] = "Squidward"
```

Summary

pop – remove and return the last item

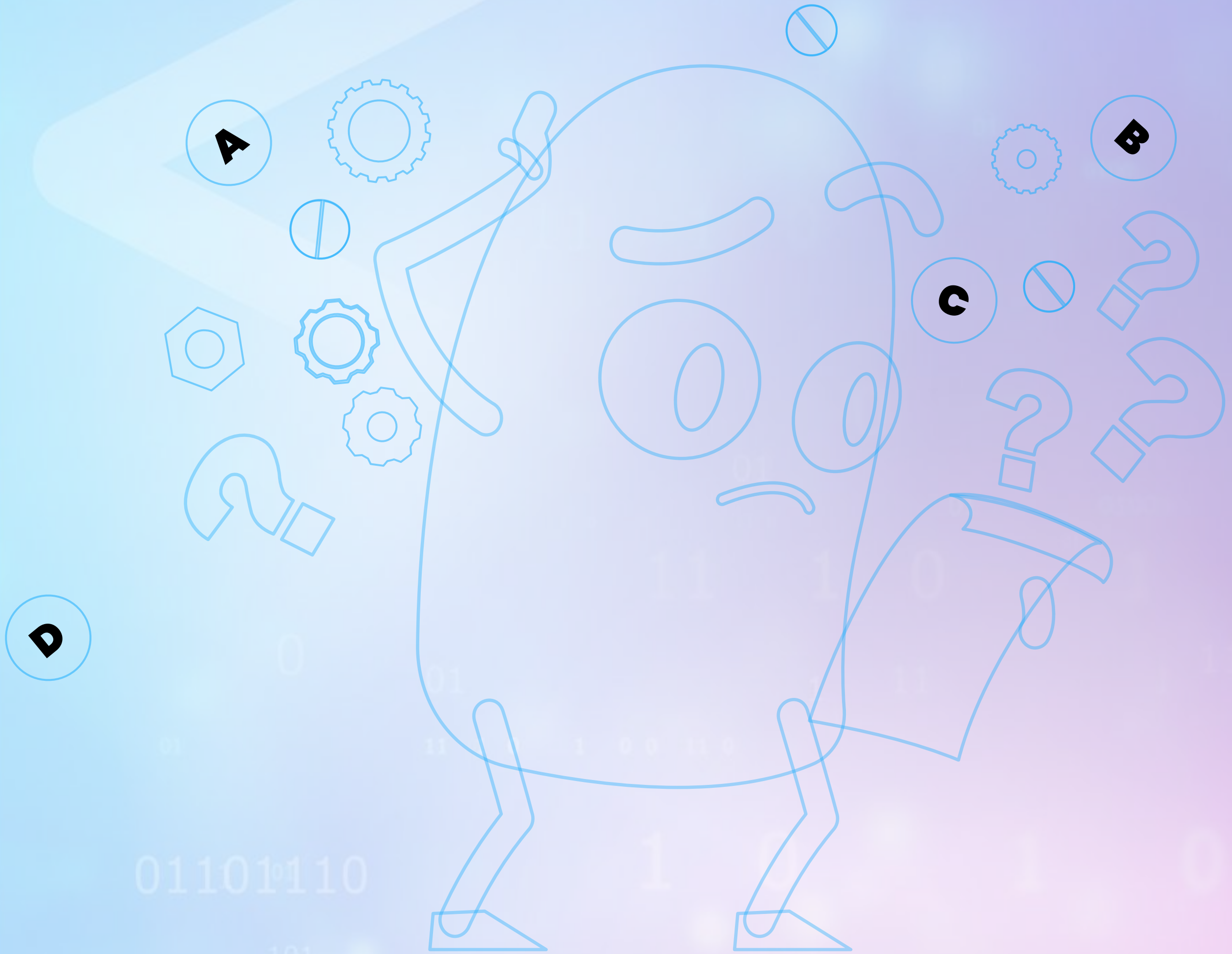
```
partyPeople.pop()
```

shift – remove and return the first item

```
partyPeople.shift()
```

unshift – insert an item to the beginning

```
partyPeople.unshift(“Gary")
```



Questions?

Sentinel

Your Turn!

> Play around, have fun, ask questions!